

The **topics** and **types of questions** examined in this Achievement Standard. Use this sheet to plan and organise your study so that you cover everything that is required.

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1.1 ALGEBRA AS 90147

Use straightforward algebraic methods and solve equations.

1.1 1. Manipulate algebraic expressions A

- expanding and factorising.
- simplifying expressions involving exponents.

► Expand and simplify: (a) $5(x+1)+2(x-3)$ (b) $(3x-1)(2x+5)$

► Factorise completely: (a) x^2-7x+6 (b) $4x^2-9$

► Simplify: (a) $3x^4 \cdot 2x^3$ (b) $\frac{9x^5}{12x^3}$

1.1 2. Substituting values into formulae A

► Josh is estimating the area of a circle by using $A = 3r^2$.
What is the area if $r = 5\text{cm}$?

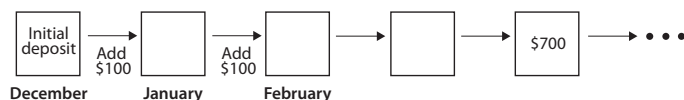
1.1 3. Describing patterns using a rule A

- writing an expression that describes a pattern shown in a diagram or table.

► In December, Garry's mother opened a savings account for his tertiary study.

She made an initial deposit and then added \$100 to the savings account every month.

After 4 months there was \$700 in total in the savings account, as shown in the diagram.



No interest is added to the account during this time.

Write an expression for the total amount of money, A , that his mother has put in the savings account after m months.

1.1 4. Solving equations A

- solving linear equations.
- solving factorised quadratic equations.

► Solve these equations:

(a) $(x+4)(x-9)=0$ (b) $\frac{2x}{3}-4=6$ (c) $6x-2=2x+9$

1.1 5. Simplifying rational expressions M

- simplifying expressions involving algebraic fractions.

► Simplify fully: (a) $\frac{3a^2-15ab}{6a^2}$ (b) $\frac{x}{3}+\frac{x}{5}$

1.1 6. Rearranging formulae M

- rearranging a formula to change its subject.

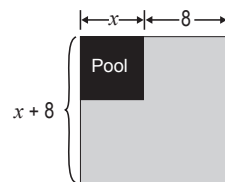
► A formula for the perimeter, P , of a rectangle is: $P = 2b + 2h$
where b is the length of the base of the rectangle
and h is the height of the rectangle.
Make b the subject of this formula

1.1 7. Solving equations in context M

- simple quadratic equations in a practical context.
- solve and interpret the results.
- completing square and quadratic formula NOT required.

► The diagram shows a square courtyard with a square pool in one corner. The area of the courtyard is 225m^2 , and the courtyard extends 8m beyond the pool.

Solve the equation $225 = (x+8)^2$, to find x , the length of the side of the pool.



1.1 8. Forming and solving linear equations or inequations M

- forming a linear equation (or inequation) in a practical context.
- solving the equation (or inequation) and interpreting the result.

► John saved \$4000 for a trip to the Olympic Games. He wanted to buy as many tickets to the swimming as possible.

Each ticket to the swimming costs \$85.
Travel, food and accommodation cost \$3100.

Use this information to write an equation or inequation. Solve your equation or inequation. What is the greatest number of tickets to the swimming that John could buy?

1.1 9. Solving pairs of simultaneous linear equations M

- pair of simultaneous equations in a practical context will be given.

► In a sale at the bookshop, all the paperback books were one price and all the magazines were another price. Robyn bought 2 paperback books and 4 magazines and paid \$39.70. Kirsty bought 3 paperback books and 1 magazine and paid \$39.80.

Solve the following pair of simultaneous equations to calculate the sale price of one magazine. Show all working

$$2p + 4m = 39.70$$

$$3p + m = 39.80$$

1.1 10. Use algebraic strategies to investigate and solve problems E

- modelling by forming and solving appropriate equations.
- interpreting in context.

► At his flat, Josh makes two rectangular gardens.

The herb garden is 2 metres longer than it is wide and has an area of 11.25 m^2 . The vegetable garden is 3 metres longer than it is wide and has an area of 13.75 m^2 . The combined width of both gardens is 5 metres.

Find the length and width of each garden. State any **equations** you need to use. Show all working. Set out your work logically.